UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/042,883	01/08/2002	G. William Walster	SUN-P6432-SPL	5601

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EXAMINER
DO, CHAT C

ART UNIT	PAPER NUMBER
2193	

DATE MAILED: 08/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Notice of Allowability	10/042,883	WALSTER ET AL.
	Examiner	Art Unit
	Chat C. Do	2193

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *06/02/05*.

2. ☒ The allowed claim(s) is/are *1-15,17-32,34-49 and 51*.

3. ☒ The drawings filed on *07 May 2002* are accepted by the Examiner.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some*   c) ☐ None   of the:

        1. ☐ Certified copies of the priority documents have been received.

        2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

        3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

    * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

    (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

        1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____ .

    (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)

2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)

3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____

4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material

5. ☐ Notice of Informal Patent Application (PTO-152)

6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .

7. ☒ Examiner's Amendment/Comment

8. ☒ Examiner's Statement of Reasons for Allowance

9. ☐ Other _____ .

EXAMINER'S AMENDMENT

1. Claims 1-15, 17-32, 34-49, and 51 are allowed.

2. Claims 16, 33, and 50 are cancelled.

3. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Edward J. Grundler on 06/23/2005.

The application has been amended as follows for avoiding relative terminology that would renders the claims indefinite:

In the claims:

1. (Currently amended) A method for using a computer system to solve a global inequality constrained optimization problem specified by a function and a set of inequality constraints $p_i(x) \le 0$ (i=1, ...,m), wherein f and p_i are scalar functions of a vector $x = (x_1, x_2, x_3 \dots x_n)$, the method comprising: receiving a representation of the function/and the set of inequality constraints at the computer system; storing the representation in a memory within the computer system; performing an interval inequality constrained global optimization process to compute guaranteed bounds on a globally minimum value of the function f(x) subject to the set of inequality constraints;

wherein performing the interval inequality constrained global optimization process

involves, applying term consistency to a set of relations associated with the global

inequality constrained optimization problem over a subbox X, and excluding any portion

of the subbox X that violates any of these relations, applying box consistency to the set of

relations associated with the global inequality constrained optimization problem over the

subbox X, and excluding any portion of the subbox X that violates any of these relations,

and performing an interval Newton step for the global inequality constrained

optimization problem over the subbox X to produce a resulting subbox Y, wherein the

point of expansion of the interval Newton step is a point x: and recording the guaranteed

bounds in the computer system memory; wherein applying term consistency involves:

symbolically manipulating an equation within the computer system to solve for a term,

$g(x'_j)$, thereby producing a modified equation $g(x'_j) = h(x)$ wherein the term $g(x'_j)$ ~~can be~~

is analytically inverted to produce an inverse function $g^{-1}(y)$, substituting the subbox X

into the modified equation to produce the equation $g(X'_j) = h(X)$, solving for $X'_j = g^{-1}(h(X))$, and intersecting X'_j with the j-th element of the subbox X to produce a new

subbox X^+, wherein the new subbox X^+ contains all solutions of the equation within the

subbox X, and wherein the size of the new subbox X^+ is less than or equal to the size of

the subbox X.

18. (Currently amended) A computer-readable storage medium storing

instructions that when executed by a computer cause the computer to perform a method

for using a computer system to solve a global inequality constrained optimization

problem specified by a function/and a set of inequality constraints $p_i(x) \leq 0$ (i=1, ...,m),

wherein f and p_i are scalar functions of a vector $x = (x_1, x_2, x_3 \ldots x_n)$, the method

comprising: receiving a representation of the function/and the set of inequality constraints

at the computer system; storing the representation in a memory within the computer

system; performing an interval inequality constrained global optimization process to

compute guaranteed bounds on a globally minimum value of the function f(x) subject to

the set of inequality constraints; wherein performing the interval inequality constrained

global optimization process involves, applying term consistency to a set of relations

associated with the global inequality constrained optimization problem over a subbox X,

and excluding any portion of the subbox X that violates any of these relations, applying

box consistency to the set of relations associated with the global inequality constrained

optimization problem over the subbox X, and excluding any portion of the subbox X that

violates any of these relations, and performing an interval Newton step for the global

inequality constrained optimization problem over the subbox X to produce a resulting

subbox Y, wherein the point of expansion of the interval Newton step is a point x: and

recording the guaranteed bounds in the computer system memory; wherein applying term

consistency involves: symbolically manipulating an equation within the computer system

to solve for a term, $g(x'_j)$, thereby producing a modified equation $g(x'_j) = h(x)$ wherein

the term $g(x'_j)$ ~~can be~~ is analytically inverted to produce an inverse function $g^{-1}(y)$,

substituting the subbox X into the modified equation to produce the equation $g(X'_j) =$

$h(X)$, solving for $X'_j = g^{-1}(h(X))$, and intersecting X'_j with the j-th element of the subbox

X to produce a new subbox X^+, wherein the new subbox X^+ contains all solutions of the

equation within the subbox X, and wherein the size of the new subbox X^+ is less than or

equal to the size of the subbox X.

35. (Currently amended) An apparatus that solves a global inequality constrained

optimization problem specified by a function f and a set of inequality constraints $p_i(x) \leq 0$

(i=1, ...,m), wherein f and p_i are scalar functions of a vector $x = (x_1, x_2, x_3 ... x_n)$, the

apparatus comprising: a receiving mechanism that is configured to receive a

representation of the function/and the set of inequality constraints at the computer

system; a memory for storing the representation, an interval global optimization

mechanism that is configured to perform an interval inequality constrained global

optimization process to compute guaranteed bounds on a globally minimum value of the

function f(x) subject to the set of inequality constraints; a term consistency mechanism

within the interval global optimization mechanism that is configured to apply term

consistency to a set of relations associated with the global inequality constrained

optimization problem over a subbox X, and to exclude any portion of the subbox X that

violates any of these relations, a box consistency mechanism within the interval global

optimization mechanism that is configured to apply box consistency to the set of relations

associated with the global inequality constrained optimization problem over the subbox

X, and to exclude any portion of the subbox X that violates any of these relations, and an

interval Newton mechanism within the interval global optimization mechanism that is

configured to perform an interval Newton step for the global inequality constrained

optimization problem over the subbox X to produce a resulting subbox Y, wherein the

point of expansion of the interval Newton step is a point x: and a recording mechanism

that is configured to record the guaranteed bounds in the computer system memory:

wherein the term consistency mechanism is configured to: symbolically manipulating an

equation within the computer system to solve for a term, $g(x'_j)$, thereby producing a

modified equation $g(x'_j) = h(x)$ wherein the term $g(x'_j)$ ~~can be~~ is analytically inverted to

produce an inverse function $g^{-1}(y)$, substituting the subbox X into the modified equation

to produce the equation $g(X'_j) = h(X)$, solving for $X'_j = g^{-1}(h(X))$, and intersecting X'_j

with the j-th element of the subbox X to produce a new subbox X^+, wherein the new

subbox X^+ contains all solutions of the equation within the subbox X, and wherein the

size of the new subbox X^+ is less than or equal to the size of the subbox X.

REASONS FOR ALLOWANCE

4.   The following is an examiner's statement of reasons for allowance:

        The prior art of records fails to disclose or render an obviousness of a method,

apparatus, and computer-readable medium for solving a global inequality constrained

optimization problem specified by a function f and a set of inequality constraints $p_i(x)$

wherein f and p_i are scalar functions of a vector X comprising receiving a representation;

storing the representation; performing an interval inequality constrained global

optimization on the function f involving performing an interval Newton steps and

symbolically manipulating an equation within the system to solve for a term $g(x'_j)$ to

produce a modified equation wherein the term $g(x'_j)$ analytically inverted to produce an

inverse function $g^{-1}(y)$ and use that inversed function to solve for X'_j as seen in

independent claims 1, 18, and 35.

The closest found prior art is Eldon ("Global Optimization Using Interval Analysis"). Eldon disclose a method, apparatus, and computer-readable medium for solving a global inequality constrained optimization problem specified by a function f and a set of inequality constraints $p_i(x)$ wherein f and p_i are scalar functions of a vector X comprising receiving a representation; storing the representation; performing an interval inequality constrained global optimization on the function f involving performing an interval Newton steps. However, Eldon fails to disclose steps of symbolically manipulating an equation within the system to solve for a term $g(x'_j)$ to produce a modified equation wherein the term $g(x'_j)$ analytically inverted to produce an inverse function $g^{-1}(y)$ and use that inversed function to solve for X'_j as seen above.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chat C. Do whose telephone number is (571) 272-3721. The examiner can normally be reached on 7:00AM to 5:00PM M-Th.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chaki Kakali can be reached on (571) 272-3719. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Chat C Do
Examiner
Art Unit 2193

June 27, 2005

KAKALI CHAKI
SUPERVISORY PATENT EXAMINER
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